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BOVINE MASTITIS

[The following article, which has been prepared by the Technical Development Committee of the National Veterinary Medical Association, brings up to date the original recommendations for the treatment of mastitis made in conjunction with the Scheme for the Control of Certain Diseases of Dairy Cattle.]

When the Scheme for the Control of Certain Diseases of Dairy Cattle was introduced in 1942, one section was devoted to mastitis and certain recommendations were made for its prevention and control. Many advances have since been made and details of these can be found in the publications which have appeared in this journal and elsewhere. The purpose of this memorandum is to summarise the present position.

Relative Incidence of *Str. agalactiae* and other Pathogens

In the previous article, it was stated that *Str. agalactiae* was responsible for 80 or 90 per cent. of mastitis in dairy cows. Observations since that time have shown that, whilst *Str. agalactiae* is predominant in the country as a whole, there are areas in which it is less frequent than in others and that in some areas, other mastitis pathogens, especially staphylococci, *Str. dysgalactiae* and *Str. uberis*, play an important role. It has, of course, always been known that these organisms can be of major importance on certain farms. Figures to show the absolute incidence of *Str. agalactiae* are available for only two counties in the South of England; in both cases, a recent random sampling of 10 and 15 per cent. respectively of the herds showed that a little over 60 per cent. had some *Str. agalactiae* infection and about half of these had over 20 per cent. infected cows. There are data which show that in one of these counties *Str. agalactiae* infection is more frequent than in all others together and that it causes nearly twice as much mastitis. No figures are available for the other.

Another factor has played a big part in the kinds of clinical mastitis which the practising veterinary surgeon sees. It is the experience of many that an increasing proportion of these cases is due to staphylococci or to streptococci other than *Str. agalactiae*. This is apparently not due to an absolute increase in the total number of these infections, but to a relative increase caused by the fact that penicillin is much more effective in sterilising *Str. agalactiae* than other infections, with the result that recrudescences are much less common in the same cow and that there is less spread to others. The practice of prescribing penicillin from the surgery as a first measure or leaving it on farms has also, for the same reason, meant that the cases the veterinary surgeon sees, or which remain as a herd problem, are much less likely to be due to *Str. agalactiae* than other organisms. Whilst this is so, it is important to remember that in many, probably most, areas, *Str. agalactiae* remains the most widespread infection, and that for every clinical case there are two in the early stages. The best service, therefore, is not being given to farmers if these are left untreated until they have lost much milk and infected other cows. The treatment of all these infections is recommended because they are usually persistent and the infection is one which can be eradicated. The treatment of subclinical infections with other organisms has less justification because a large proportion of them disappear spontaneously and there is much less chance of eradicating them from a herd.

Methods of Diagnosis

The clinical case needs no special method of diagnosis. The only satisfactory method for detection of early cases and as a basis of treatment is a laboratory examination of milk samples. In the past this was limited by the absence of adequate facilities. Simpler methods of laboratory examination have, however, been developed recently and a fully adequate service is already available in one area. Increased facilities are also now available at several veterinary investigation centres and will soon be at others, and it is hoped that in the near future adequate facilities will be available in all parts of the country.

Failing laboratory examination, the strip cup gives useful information before the disease reaches an advanced stage. When a strip cup is used the hands must always be washed in disinfectant between examination of successive animals.

Spread of Infection

In the case of *Str. agalactiae*, further evidence has accrued that infection enters by way of the teat and that it can easily be spread from cow to cow by milkers' hands or the cups of the machine, but apparently less easily by the latter method. Udder cloths and towels are also commonly infected. It has also now been shown that in an infected herd a large proportion of sores or chaps harbour the germ and these may be a source of infection of the udder itself in the same cow or another. It has been shown further that the skin of the teats and the milkers' hands may remain infected from one milking to another and that in a heavily-infected herd, the skin of the cow's body, milkers' clothes, floor, partitions and, in fact, everything in the byre, become contaminated and may remain so for considerable periods unless infection is removed. There is also some circumstantial reason for believing that the udder of the calf occasionally becomes infected when it is sucked by another calf whose mouth has become contaminated by infected milk, and that this infection may persist until she calves. As far as is known, there is no reservoir of *Str. agalactiae* in the cow's body, except the udder. There is some fairly recent evidence that older cows can be infected more easily than younger ones and that amongst cows of the same age there are differences in the ease with which they can be infected. As a result, some animals can overcome an infection but in the majority persistent infection is the rule.

In the case of the other streptococcus infections and staphylococcus infections, there is no doubt that infection usually takes place also *via* the teat during milking and they can also in some cases become widespread in a byre. These infections differ from *Str. agalactiae*, however, in that they can be harboured in the tissues of the cow's body and, in the case of the staphylococci, are resident flora of the cow's

skin as well as of human hands, forearms and nose. Infections of the udder with these organisms usually are overcome so that it is common to find a cow infected at one test and not at a subsequent one; though it may then be found in other cows which were previously clean. For these reasons, infections other than *Str. agalactiae* do not lend themselves to eradication, though success has on occasion been achieved with *Str. dysgalactiae*.

Where infection does become established with these other organisms, it may, as is well known, give rise to acute mastitis which may ruin the quarter in a few days or may be quickly overcome. Experience has shown, however, that chronic infections indistinguishable clinically from *Str. agalactiae* are not uncommon, especially with *Str. uberis* and staphylococci, and that they may occur with *Str. dysgalactiae* and *Str. zooepidemicus*.*

Factors which Assist Development of the Disease.—It is commonly believed that rough inexpert milking and stripping, bruising and chilling, excessive vacuum or excessive pulsation rate in machine milking or leaving the cups on an empty quarter, allowing the teat cups to creep up, overstocking and anything which hinders proper emptying of the udder, are injurious to the udder and predispose to the establishment of an infection or its development; or that these factors may, in themselves, lead to a non-specific mastitis. There is little experimental data on most of these points, but much circumstantial evidence, and when numerous cases of clinical mastitis occur in a herd, they should be looked into, especially if many cows show no mastitis bacteria.

Prevention of Infection.

Clinical cases should always be isolated or milked last, and treated at once. If sub-clinical infections have been established by bacteriological examination of the milk, these cows should be milked after clean cows, treated promptly, all practicable measures taken to hinder spread and resampled to find whether treatment has been effective.

Cuts, sores and chaps should be given prompt attention by the usual methods. In resistant cases, Cetavlon ointment has proved of real value but it is probably undesirable to use it for more than a week or two, though on most cows no harm results. It is desirable that udder ointments should have non-greasy bases.

Before milking, the teats and udder should be cleansed in one of two ways.

(*a*) *Cleansing with sterilised cloths at about* 125° *F.*—In machine-milked herds where no hand stripping is done, the following method has proved effective and practical: Gross dirt or dung is removed as soon as the cows enter the byre. Cleansing of the teats and udder is done with a damp sterilised cloth (one to each cow), at about 125° F. Sufficient udder cloths are sterilised by boiling in a small copper or bucket for ten minutes at such an interval before milking that the temperature has dropped to about 140° C. by the time milking is ready to begin. If it drops too low, boiling water can be added from a kettle. It can also be kept warm by putting the container in a hay box. Alternatively, the cloths can be steam-sterilised with other equipment and immersed in water at 140° F. just before needed. Small coppers heated by electricity or Calor gas can be arranged if desired, and these, mounted on a small trolley, have proved practical for cowshed milking. A cloth is wrung out when needed and its temperature will have dropped to about 125° F. by the time it has been wrung damp and shaken out for use. After use, it is put into a bucket ready for re-sterilisation.

(*b*) *Using disinfectants.*—Have two buckets of disinfectant solution each with its own cloth. Use one for washing off gross dirt; the other for finishing with the cloth wrung out of the solution. Each cloth should always be immersed in its own bucket of solution between cows. If only one bucket is used, there should be two cloths used alternately. Disinfectant solution should be at proper strength and renewed when dirty or at least every ten cows.

Whatever method is used, the cleansing of the udder should be done immediately before milking each cow because it then acts as a regular stimulus to "let down."

Hands should be clean before milking and rinsed in the disinfectant solution after taking fore-milk, milking or stripping each cow, or wherever the teats or udder have been handled for any purpose. The milking machine should be clean before milking and the cups rinsed in clean water and then in disinfectant after milking each cow. The air line should be broken or the cups put in horizontally and care taken to see that the disinfectant reaches all parts of the inside. (A few trials with a dry liner will demonstrate to the milker the necessity of this.) In some herds, each bucket is provided with two sets of clusters, one of which lies in disinfectant whilst the other is in use.

There is much evidence that hand stripping can be dispensed with without loss of yield and removal of one source of spread of infection; machine stripping may be carried out by downward massage towards the cups which are drawn slightly in the direction of each teat in turn. Special care is necessary with animals in late lactation and during transition from hand to machine stripping.

Treatment

Str. agalactiae mastitis.—Administration of sulphanilamide by mouth can now be regarded only as a first aid remedy because, although it is followed by disappearance of clinical symptoms in the large proportion of cases, sterilisation of the infection occurs in only about 25 per cent. of cases. The acridine dyes have also now been superceded as have also certain other drugs such as tyrothricin, Novoxil, sulphanilamide-in-oil, tested in recent years for udder injection. Diamino-diphenyl-sulphone (with or without penicillin) appears to be of high efficiency and suitable for clinical cases or use in dry cows, but cannot be recommended for treatment of milking cows. Penicillin is at present the drug of choice, because it is of high efficiency, causes little or no irritation or decrease in milk yield in milking cows and so far shows no likelihood of producing resistant strains. The method of administration should always be from collapsible single dose tubes because even in the most careful hands there is danger of transmitting tubercle bacilli or other pathogens if other methods are used. For removal of symptoms in a clinical quarter 100,000 units should be used once a day after stripping, or smaller doses two or more times a day, and there is much to be said for treating all quarters if one is affected. Response is usually quick but when symptoms have disappeared, treatment should be continued for a further two days.

For eradication purposes, where it is necessary to sterilise as near 100 per cent. as possible, treatment should be such that bactericidal concentrations are maintained in the udder for five or six days. Injection after the afternoon milking of (*a*) five doses of 20,000, 50,000 or 100,000 units ordinary penicillin at daily intervals; or (*b*) three doses of 100,000 units ordinary penicillin at intervals of 48 hours; or (*c*) two doses of 100,000 units procaine-penicillin at intervals of 72 hours, all sterilise about 90 per cent. of infections. Attempts are

* *Str. zooepidemicus* has often been called the "actively haemolytic Group C streptococcus," or the "animal pyogenes streptococcus."

being made to find an equally efficient single dose method but none is yet available.

Some further work has been done on vaccines but none can be recommended for prevention or cure.

Treatment of Other Forms of Mastitis in Milking Cows.—Penicillin is of considerable value in the removal of clinical symptoms in the other forms of streptococcal mastitis and in staphylococcal mastitis provided the condition is not already too advanced—as may be the case, for example, in a staphylococcal infection which is already nearing the gangrenous stage or an acute case due to *Str. dysgalactiae*. It is less effective, however, in sterilising these infections. A large proportion of *Str. dysgalactiae* and *Str. zooepidemicus* infections are removed by the five or six days' course of treatment recommended for *Str. agalactiae*, but *Str. uberis* infections frequently resist and, though staphylococcal infections are commonly reduced to small numbers, sterilisation is not usual.

In clinical cases or chronic infections which do not respond to penicillin, one of the more active sulphonamides, or other drugs as they become available, should be tried in collaboration with a laboratory in order that the results may be correlated with the bacteria present. In staphylococcal mastitis, some practitioners hold the view that the administration of toxoid is of considerable value in the treatment of clinical cases. There is little or no information on its value as a preventive; it is worth considering the holding of controlled trials.

The treatment of these "other infections" is a challenge to our abilities and a concerted effort by practitioner and laboratory might lead us to better results.

Eradication and Maintenance of Herds Free erom *Str. agalactiae*.

There is now ample evidence from work in this and other countries that *Str. agalactiae* can be eradicated and herds maintained free. When this depended mainly on segregation of infected cows until they could be replaced, progress was slow. With the introduction of methods of treatment of high efficiency which can be applied without hesitation to all infected cows, progress is quicker. Treatment of infected cows only may result in quick eradication if the numbers of infected cows in a herd are not large. If the incidence is high, however, better and quicker results can be obtained by treatment of all cows in milk or dry, infected or not, at the same time. Disinfection of cows and premises helps but is not essential.

Results to date show that in herds so treated, clots or other signs of *Str. agalactiae* mastitis disappear at once, that in over one-third of the herds eradication may be expected at once and that in most of the remainder new infections or recrudescent infections are confined to a few cows. Some herds give more difficulty, usually because of persistent skin infections of the udder, the owner's reluctance to remove or isolate a resistant case, or rank bad sanitary conditions. Mastitis caused by other streptococci or staphylococci is not usually eradicated but generally reduced. Considerable increases of yield are common and are biggest in the lactation following treatment; presumably because new development has occurred unhampered by mastitis germs.

Infected cows which have been treated should be tested between one and two weeks afterwards. If still infected, they should be retreated at once and retested. If a cow fails two treatments, her history and clinical state should be given weight and, if an old case, she should be disposed of unless of exceptional value. Cows remaining infected after the herd treatment must be isolated or every precaution taken to prevent spread to other cows, pending retreatment and test.

If any infection was found at the first test, the whole herd should be retested every two months until two tests have been passed, covering four months from the date when the last infection was treated; then at twelve monthly intervals. If no infection was found at the first herd test, another should be made after twelve months. Any *cow* purchased should be treated at once unless she has recently passed a bacteriological test. All the other additions (purchased heifers, cows recalving and home-bred heifers) should be tested at once and handled with penicillin cream on hands and udders until proved clean—unless they have been proved clean in the previous lactation.

Another method of eradication which has given good results is treatment of all infected cows when they go dry. This has, however, the disadvantage that eradication must take at least one year and that clean cows are returned to an infected environment unless a separate herd is formed.

Summer Mastitis

It used to be thought that in nearly all cases of this condition, the only organism present was *C. pyogenes*. Work in the last few years has shown that a variety of bacteria are frequently found in the same case, *viz.*, *C. pyogenes*, *Str. dysgalactiae* and a symbiont on it, and an anaerobic streptococcus, whilst in some cases staphylococci and even *Str. agalactiae* have been found.

This variety of flora is probably responsible for the different severity of the cases in different areas or farms and the variation of response to treatment. On the whole, however, there is no satisfactory treatment, though prompt administration of sulphapyridine, penicillin or *C. pyogenes* toxoid may all save the animal's life and sometimes even the quarter.

In large field trials in recent years, results have been less conclusive than might have been expected, owing to the low incidence, but no evidence has been obtained that *C. pyogenes* toxoid or vaccines are of practical value. Repeated penicillin injections during the dry stage hold some promise but the procedure would be costly and, until further work has been done, it is not justified in view of the varied and usually low incidence on a given farm.

Meanwhile, the best advice to the farmer is to see his dry stock twice a day in July, August and September and to call his veterinary surgeon at once if the disease is suspected. It is by no means certain that flies are, as often stated, concerned in transmission, but in the present state of our knowledge, the possible value of teat seals and fly repellents cannot be denied.

MEDICINE SPOONS

A specification has been issued by the British Standards Institution (B.S. 1348:1949) for spoons used in measuring medicine. Details are given of the requirements for teaspoons and tablespoons; subject to a tolerance of ± 5 per cent., the levelled capacity of the teaspoon must be 60 minims (1/160th of an Imperial pint) and of the tablespoon, 240 minims (1/40th of an Imperial pint). The spoons are to be made of glass, china, chromium-plated metal or a plastic material. If made of the last-mentioned, then there can be used either (1) an odourless thermo-setting material conforming to the requirements of either B.S. 771 (synthetic resin, phenolic, moulding materials) or B.S. 1322 (synthetic resin, aminoplastic moulding materials) or (2) a thermoplastic material with a softening point not below 93° C.

The spoons are to be shaped in the form of an ellipse, the nominal length of the internal rim being 1¾ inches for teaspoons and 2 inches for tablespoons, each spoon having a handle sufficiently strong for use with viscous substances such as syrup, without bending the handle, and 3 inches long for teaspoons, or 5 inches for tablespoons. Where the material permits the spoons are to be coloured red. The specification lays down that such spoons should be marked "B.S. 1348" and should bear indelibly the word "medicine."—*Pharm. J.*

THE USE OF PENICILLIN IN THE PREVENTION OF *C. PYOGENES* INFECTION OF THE NON-LACTATING UDDER

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In this paper are recorded results arising from the second of a series of experiments carried out in Northern Ireland designed to find an agent suitable for preventing *C. pyogenes* infection of the bovine udder.

The first series of experiments was started in 1942 and concluded in the summer of 1945. Its object was to estimate the protective power of monthly and fortnightly alum-precipitated toxoid injections against *C. pyogenes* invasion of the udder during the summer months. The results are summarised in a paper given by Lovell, Pearson and Foggie (1950). Over 4,000 dry cattle were involved in this group of experiments but the incidence of the disease during these summers was so low that little conclusive evidence as to the value of the toxoid was obtained. An indication was given nevertheless that, although a reasonably high antitoxin titre was produced by the methods of inoculation, little protection was given against the invasive powers of *C. pyogenes* in the udder.

A concurrent field experiment was carried out in 1944, using three fortnightly injections of a commercially produced anaculture. The trial involved nearly 500 susceptible cattle but the results were similarly disappointing and more conclusive that the agent gave little protection against the organism.

In Great Britain the non-lactating udder of the cow and heifer is apparently more susceptible to *C. pyogenes* infection than the milking gland. This is certainly the case in Northern Ireland, where the familiar summer mastitis syndrome is observed each summer in from 2 to 10 per cent. of dry cattle in the country and in a small proportion of milking animals. Udder infection with *C. pyogenes* occurs in approximately 70 per cent. of these affected animals (Pearson, 1949).

The second series of prevention experiments about to be described was therefore based on the fact that 92 to 95 per cent. of summer mastitis cases occurred in non-lactating cattle. Doubts exist as to when and by what route *C. pyogenes* gains access to the mammary gland, although in cases of lacerated teats and tears on the udder the route is obviously *via* the skin. On the assumption, therefore, that gross invasion of the non-lactating udder was not liable to occur through the teat or from an internal source it was designed to introduce an anti-bacterial agent into the udder with the object of neutralising or inhibiting the growth of any latent bacteria which might be present in the gland. It was also considered that while the agent was present, infection *via* the teat presumably would be difficult.

Penicillin was chosen in preference to other agents for several reasons:

1. *C. pyogenes* was found in comparison with the "Oxford" staphylococcus and udder streptococci to be relatively sensitive to the drug. Other workers, *e.g.*, Slavin (1946) and Hughes and Farmer (1949), have also reported that the organism is sensitive to penicillin.

2. It was observed in a limited number of non-lactating quarters affected with *Str. agalactiae, Str. dysgalactiae* and *Str. uberis* that a single injection of 100,000 units of procaine penicillin in oil invariably eradicated the infection for a period of at least two to three weeks. A second injection given after 14 days made certain that the infection, unless it was due to a staphylococcus, definitely was eliminated.

3. Penicillin could be injected into the non-lactating udder in the bases used without causing irritation.

4. Salts of penicillin were readily available in 100,000 unit phials and were also obtainable in collapsible tubes containing 100,000 units in 1 ml. arachis oil and bees wax mixture.

MATERIALS AND PROCEDURE

Animals.—Dry cattle of the type likely to develop summer mastitis were chosen on farms on which the disease was known to have occurred in previous years. Animals whose udders were not quite dry when teat infusions were being given, *i.e.*, within the first 14 days in July, were not involved in the experiment. Most of the cattle were advanced in pregnancy. A few first calving heifers were included but the majority had borne at least one calf. If any fluid or pus was present in the udder, it was withdrawn before the inoculations were carried out.

Penicillin in Water.—Phials containing 100,000 units sodium penicillin were used for each quarter. The drug was dissolved in 5 ml. sterile distilled water and injected into the teat by syringe and teat needle, after cleansing the point of the teat with spirit.

Penicillin in Oil.—Collapsible tubes designed so as to express 100,000 units calcium penicillin suspended in 1 ml. arachis oil and 4 per cent. bees wax mixture, were used for teat inoculations. The nozzle of the tube was approximately ½ inch long and adapted for insertion into the lumen of the teat.

Examination of Udder Secretions.—Samples from mastitis cases occurring in the control and treated animals were taken by the author or sent by the veterinary surgeon concerned, together with a history of the case. Udder secretions failing to yield *C. pyogenes* in culture were not recorded in the percentage incidence.

Inoculations were started in the summer of 1947, when over 1,000 susceptible cattle were available for experimental work. Penicillin in water was used in one group and penicillin in oil in another, 40 to 50 per cent. untreated control animals being left on every farm in each group.

Inoculations were given within the first 14 days of July, and the incidence of cases was recorded until the middle of September. The numbers inoculated and the results obtained in the 1947 experiment were as follows:—

Penicillin in Water (1947)

Total treated (Including 31 heifers)	345
Total untreated (Including 53 heifers) ...	382
Incidence in treated cattle 24 cases	7%
Incidence in controls 20 cases	5·2%

Penicillin in Oil (1947)

Total treated (Including 18 heifers)	230
Total untreated (Including 32 heifers)	206
Incidence in treated cattle 3 cases	1·3%
Incidence in controls 21 cases	10·5%

The results using penicillin in water indicated that the drug given in this way was of no value in preventing *C. pyogenes* invasion of the udder. In comparison, the oily injections apparently had an appreciable effect in preventing the disease, probably due to longer persistence of

penicillin in the udder. It had been observed in preliminary experiments, that detectable quantities of penicillin persisted in the dry udder for a maximum of seven to eight days following inoculation of 100,000 units in 1 ml. oil bees wax base. Penicillin could not be found in the udder after the fourth day following inoculation of 100,000 units dissolved in water.

A similar experiment using the oily suspension only was carried out in 1948. Nearly 1,000 cattle were used, the results obtained being as follows:—

Penicillin in Oil (1948)

Total treated (Including 47 heifers)	563
Total untreated (Including 57 heifers) ...	431
Incidence in treated cattle 30 cases	5·3%
Incidence in controls 43 cases	10·0%

The results obtained in the second year were not so encouraging as those obtained in the 1947 experiment. This may have been partly due to the fact that the disease did not start until nearly the end of July in 1948, whereas in 1947 cases were quite numerous by the beginning of the month. As the teat injections were given each year within the first 14 days of July, the inference was that the injections were given too early in the second year. All the penicillin was absorbed from the udders when the epidemic began and if this had been anticipated, a second injection would have been given a fortnight or so after the first.

Experiments using Procaine Penicillin

In the summer of 1949 further preventative inoculations were carried out on similar lines using procaine penicillin G in 1 ml. arachis oil with aluminium monostearate. This product was available in 100,000 unit doses in collapsible tubes and was considered to have better powers of persistence in the udder than the calcium or sodium salts.

Preliminary tests confirmed this point, and it was observed that some non-lactating quarters retained inhibitory quantities of procaine penicillin even after 14 days. In the majority of cases, however, detectable quantities of penicillin were absent after the tenth or eleventh day. The nature and quantity of the udder secretion present in the gland appeared to have a bearing on the persistence of the drug as also did the numbers and type of bacteria present.

Hughes, Christie and Farmer (1950) have carried out persistence tests on two non-lactating udders using procaine penicillin. They report that demonstrable penicillin was not found after five days in unaffected quarters and that the limited period of persistence in two infected quarters which were inoculated was only four and a half days. As in the present experiments, these workers used a single 100,000 unit dose.

Further experiments along these lines using larger doses of penicillin and a larger volume of the oily base are being carried out in Northern Ireland.

In the field preventative trial using procaine penicillin the procedure was similar to that carried out in the two previous years. Ninety-one farms were involved. Single teat inoculations were given within the first three weeks in July, one-third to one-half of the susceptible animals on each farm being left as controls.

The results were as follows:—

Total treated (Including 17 heifers)	554
Total untreated (Including 35 heifers)	430
Incidence in treated cattle 11	2·0%
Incidence in controls 38	8·8%

Again only pure or mixed infections yielding *C. pyogenes* are recorded in the percentage incidence and it is encouraging to see a further result in favour of the teat inoculations.

Ten of the eleven cases in the treated group occurred 20 days after the inoculations were given while the control animals became affected at fairly regular intervals until the middle of September. One treated animal was acutely affected 24 hours after being inoculated but no satisfactory explanation could be obtained to account for this. The cow eventually lost two quarters.

A subsidiary experiment using two teat injections of procaine penicillin was carried out on a further six farms. Seventy dry cows were injected in the second week of July and again three weeks later. Forty-seven uninoculated cattle were left as controls. Unfortunately only one case of *C. pyogenes* mastitis occurred in the control group and none in the treated group, and no conclusions could be drawn.

Discussion

The figures obtained from the three summers' experiments are much more encouraging than any obtained in prevention experiments using alum-precipitated toxoid. They suggest that a 50 to 70 per cent. degree of protection is given to the inoculated cattle against *C. pyogenes* invasion of the udder. Also if the period of summer mastitis outbreaks could be forecast or would coincide with the time of teat inoculations given early in July there is a strong suggestion that this degree of protection might be higher.

The main principle of the method used is of course sterilisation of the udder, and the results of experiments using multiple teat injections may prove to be even better. It is hoped to design full scale trials using this method in future years. Unfortunately only one case of *C. pyogenes* mastitis occurred in the small trial of this kind carried out in 1949.

As a practical method of control of summer mastitis it would appear to be well worth while inoculating the teats of dry cows at intervals of two to three weeks in badly affected areas, even if the percentage of protection given were only 70. Problem animals would, of course, be cows not quite dried off at the beginning of July and first calving heifers. It is difficult, however, to put cows dry at that time of year and inoculating the teats of frisky young heifers at any time is no easy task.

One serious obstacle to carrying out such experiments is the increasing difficulty of keeping control animals untreated. Several farms had to be ruled out of the present experiments as tubes of penicillin were made available to the farmer through legal or illegal sources. It is probable, therefore, that in future years it will be more difficult to avoid even more waste of time and material. Dummy tubes would help to solve the problem but would double the work.

It is hoped, nevertheless, as other antibiotics become available, to design further trials using agents with powers of longer persistence in the udder. Nisin, for instance, may be found to give reasonably good results. Chemical bacteriocides have been found in the main to have irritant qualities and to stimulate the secretion of fluid in the dry udder.

Summary

A description is given of a second series of experiments designed in Northern Ireland to prevent *C. pyogenes* invasion of the udder of non-lactating cattle during the summer months.

Three thousand two hundred cattle have been involved in field trials carried out over a three-year period, using salts of penicillin as a preventative teat inoculation.

Procaine and calcium penicillin incorporated in an oily base with or without aluminium monostearate have been found to give 50 to 70 per cent. protection against *C. pyogenes* invasion of the udder.

The time and number of inoculations in relation to the disease incidence is considered to be an important factor in obtaining protection. It is thought that other antibiotics or bacteriocidal agents may have greater powers of persistence in the dry udder and consequently be even more effective in preventing the disease.

Penicillin in a watery base has been found to give little protection against *C. pyogenes* invasion of the udder.

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COUNCIL FOR THE PROMOTION OF FIELD STUDIES

The report for 1948-49 of the Council for the Promotion of Field Studies shows (states *Nature*) that the four field centres at Malham Tarn, Flatford Mill, Juniper Hall and Dale Fort are now open all the year round except for short breaks in the winter. The great variety of students who have already made use of the centres include a large number of groups from university departments; this demand is likely to grow as the opportunities for field work at the centres become more widely known. The University of London in particular has made great use of the centres, and students have been sent from nearly every one of the constituent colleges. For the third time practical courses for the certificate of proficiency in natural history have been held at Flatford Mill Field Centre in association with the Extra-Mural Department of the University of London. The proportion of teachers who attend courses is steadily growing; but although a number of sixth-form grammar school students have been able to make use of the centres, many have been prevented from doing so by the difficulty of obtaining grants-in-aid from their local education authorities.

* * * * *

COWS ELECTROCUTED

Shortly after morning milking 14 cows on a smallholding near Lanark were recently found bellowing with terror, and struggling to escape from the chains which secured them to the stalls. One cow, the fifteenth in the herd, was lying dead. With commendable courage the frenzied animals were released by two brothers, who themselves suffered from electric shock, reports the *Weekly Scotsman*. Before they had completed their task another cow collapsed and died. That night, after electrical engineers had made tests and found no faults to explain the shock, a third cow died in an adjoining byre near a metal shed. A *post-mortem* examination was carried out by Mr. Andrew Orr, M.R.C.V.S., of Lanark, and his findings were compatible with electrocution. Investigations by the Department of Agriculture for Scotland, to whom the smallholding belongs, failed to account for the accident. The electric contractors who are re-wiring the buildings were unable to explain it, but suggested that the sandy soil might have provided a poor earth.

* * * * *

Weekly Wisdom

Unfortunately the inherent nature of the soil cannot be changed, and though land which produces little or nothing can, at a price, be persuaded to grow reasonable crops, yet bad land cannot be made into good and no "once and for all" payment will suffice to keep true marginal land in full production.—An Agricultural Correspondent in *The Times*.

CLINICAL COMMUNICATION

INTRAMEDULLARY REPAIR OF FEMORAL FRACTURES IN THE DOG AND CAT

WILLIAM HENDERSON, M.R.C.V.S.,

Hampton

Fracture of the femur may be readily diagnosed by manipulation, but the accurate determination of the type of fracture is made extremely difficult and often impossible because of the heavy thigh muscles. It would seem to be the duty of the practitioner, where circumstances permit, to have an X-ray examination made of all femoral fractures encountered in his practice. As a result of London street accidents, I receive on an average three to four femoral fractures each week, and I would hesitate to commit myself on type before seeing the radiographs.

In the past I have had many disappointments in repairing these fractures with plaster casts, since healing has often taken place with shortening of the limbs. The methods of Shroeder, Nichols, and other Americans with modified Thomas splints using duraluminum rods have generally given good results, and represent an advance on plaster methods, especially in fractures of the neck and proximal shaft of the bone. Callus formation has, however, often been slow, and deformity has sometimes remained. One usually finds that an owner is pleased enough to get his animal back with only slight shortening of the limb, but we have not always shared his pleasure.

On this subject of specialised methods of internal fixation, there seems to be some pronounced opposition, and I must say I have been amazed to hear free criticisms advanced by practitioners who admit they have never attempted to pin a bone. Can there be any doubt at all that the achievements of veterinary specialists in this field represent a solid advance? The reports of the leading American exponents, and in Britain the work of Knight[1], are extremely favourable and show a very low percentage of failures. Their published results are sufficient answer to the critics.

When in 1948 Brinker[2] published his work on intramedullary nailing of the femur after open reduction, he showed that this technique had the advantage of maintaining a full function and promoting rapid repair of the bone. The technique generally used took advantage of the fact that the trochanteric fossa, lying medial to the trochanter major, is in direct line with the medullary cavity of the femur, and once the pin is inserted at the fossa it travels through the medullary canal to engage the distal fragment of the bone when reduction, either closed or open, has been effected.

More recently a modified technique for pinning has been described by Dr. Salo Jonas, of New Haven, Connecticut[3]. In this method the 18/8 stainless steel pin is sharpened at both ends to facilitate introduction into the intramedullary space after open reduction. Brinker's method of insertion can be a difficult process, at any rate for the beginner. Certainly it should not be attempted until it has been thoroughly worked out on the cadaver. When the pin is sharpened at both ends, insertion presents no difficulty at all. Recently I have tried out the method in seven cases of femoral fracture in the dog and cat, with six completely successful results. The seventh case, an epiphyseal fracture, was a failure, and I shall discuss it later in the case reports. My colleague, Mr. P. S. Lambert, B.Sc., M.R.C.V.S., has

FIG. 1 (Case 1).—Mid-shaft fracture of the femur in a dog, aged nine months, with maximum over-riding.

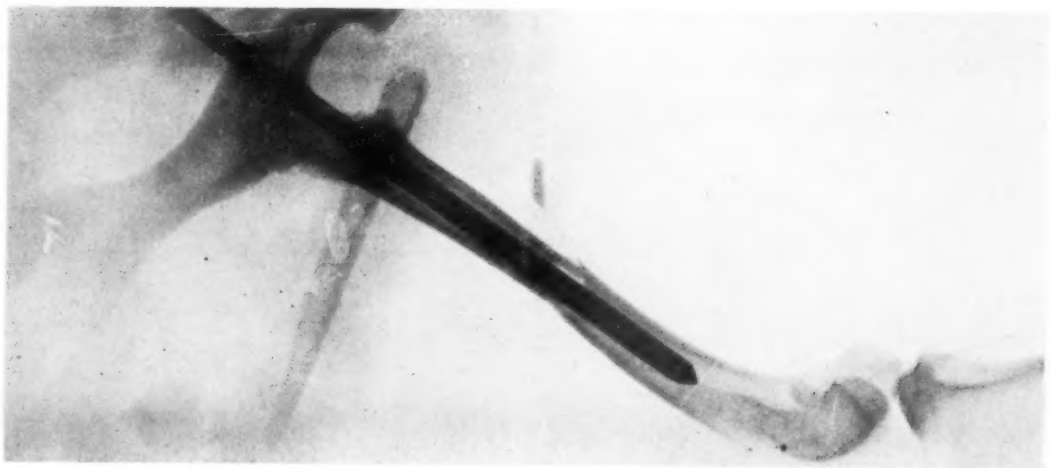

FIG. 2 (Case 1).— The intramedullary pin *in situ*. Note the bone fragment.

FIG. 3 (Case 2).—Immediately after open reduction of intramedullary pinning. The bone fragments act as additional splintage.

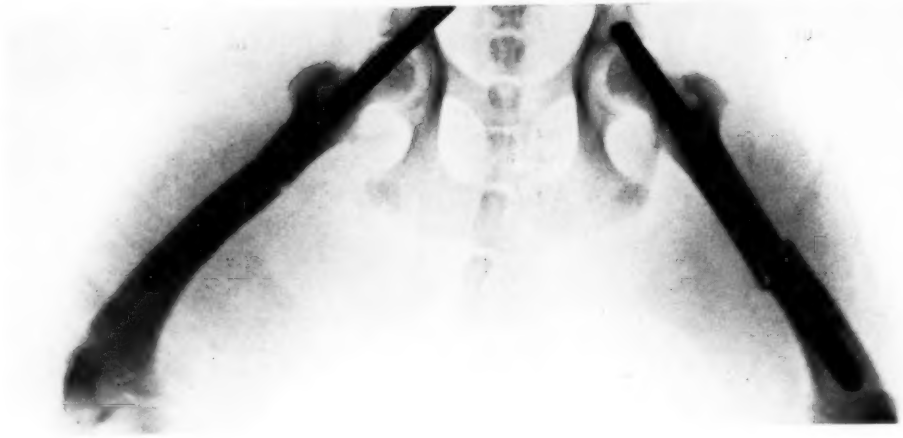

FIG. 4 (Case 3).– Immediately after intramedullary pin fixation.

FIG. 5 (Case 4).—The intramedullary pin *in situ*. Note the gap in this case of oblique fracture.

FIG. 6 (Case 4).—Large callus formation after 26 days.

FIG. 7 (Case 5).—The intramedullary pin in position, following open reduction.

also obtained a successful result using the method in a fracture of the shaft of the tibia.

One of the early lessons to be learned in intramedullary nailing is to use a pin large enough to fill the marrow cavity. Where the pin used is adequate, one will generally find that the animal's foot is on the floor within 48 hours of the operation. In one case of oblique fracture described below, where too narrow a pin was used, the animal did not take weight for 14 days. By inserting the heaviest possible pin, the restoration of full function is speedy and repair proceeds apace.

CASE REPORTS

The reports of cases fixed internally with the double-pointed pin are appended:—

Case No. 1. A cross-bred terrier, aged nine months, was presented with mid-shaft fracture of the femur and maximum over-riding (Fig. 1). There was considerable oedema in the leg. Profound nembutal anaesthesia was induced, and the area from above the lumbar vertebrae to the stifle joint was shaved and cleansed both outside and inside the thigh. A hobble was applied below the hock to facilitate traction and a broad-webbed bandage was slipped inside the thigh and fixed to the table. After laying sterile cloths, an incision of about 2½ inches in length was made in the skin over the fracture site, and carried boldly to the lateral head of *M. Quadriceps Femoris*. Haemorrhage was very slight. The lateral head of the muscle was deflected forwards and the broken bone exposed. There was deep penetration of muscle tissue by the broken ends of the bone. The proximal shaft of the bone was grasped with the index finger and thumb of the left hand, and the point of the pin was inserted into the intramedullary canal. With an assistant applying opposing pressure to the trochanter major, the pin was pushed up the canal by quarter-rotatory turns of the Kirschner chuck. Due to the maximum diameter of the pin, the progress up the canal was slow and was twice checked with the fluoroscope. After a hold-up at the trochanteric fossa, the pin emerged and was surfaced by nicking the skin over the point. The Kirschner chuck was withdrawn from the lower extremity of the bone and was now applied to the upper end. The pin was pulled up through the canal until the bare point remained protruding at the lower end. Traction was then applied by two assistants to approximate the distal fragment, helped by bone forceps in the hands of the operator. Reduction was effected and the point of the pin engaged the distal fragment and was driven through the canal (Fig. 2). The muscle was dusted with sulphathiazole and proflavine, and a few catgut sutures closed the upper layer. Nylon sutures closed the skin over the pin and over the operation site. 300,000 units of procaine penicillin were administered daily for four days. Luminal sodium was used to alleviate post-operative pain, but in fact this dog used the limb within 36 hours and showed little discomfort. Healing was speedy, by first intention, and the operation wound had actually healed before other abrasions caused at the time of the accident had done so. Twenty-eight days later the pin was removed. Both legs were equal in length, and when the dog was discharged a week later, he showed no signs of lameness.

Case No. 2. A one-year-old tom cat was admitted to hospital with a comminuted fracture of the shaft of the femur and several loose fragments. He was anaesthetised with oxygen-ether, and a 2-inch incision in the skin was carried to the fracture with very little haemorrhage. A double-pointed pin, somewhat narrower than I would use now, was inserted as before, and approximation of the distal fragment was easy. No attempt was made to remove a large fragment of bone, which is shown in the radiograph (Fig. 3). The accepted view is that fragments of bone act as small splints to support the main body of the bone during healing. Procaine penicillin (200,000u) was administered daily as before. In spite of the light pin, the cat took some weight on the leg on the day following the operation. If anything, he seemed to suffer less discomfort than the dogs. The elastoplast dressing covering the protruding point of the pin (unburied in this case) was licked continuously for several hours and was then forgotten. An interesting point was that the cat persistently refused to empty his bladder for some days following the operation, but he may just have been the proverbial "clean cat." Some infection in the operation wound took place on the fourth day. Soluthiazole was administered, and the infection quickly cleared up. On the 25th day the pin was removed, and the cat showed only slight lameness. This tom cat had been abandoned by his owners following the accident, and he now lives in the hospital building. Eight weeks later, in competition with three female hospital cats up a tree, he is by no means an "also ran"! Both legs are equal in length.

Case No. 3. A cross-bred Irish terrier, aged eight months, was brought to us by a neighbouring veterinary surgeon after an accident in which the animal was run over by a 'bus. The radiograph showed fracture of both femurs, with over-riding. The operative technique was as before, both legs being pinned (Fig. 4), and both pins were left protruding. On the third day after the operation, the terrier was able to stand on one leg, and get out of and into his basket when necessary. Weight was being taken on both legs by the beginning of the third week, and he was able to walk outside when he had a mind to do so. During the fourth week he was walking well, the action being only slightly stilted. When picked up from the street this puppy had shown conjunctivitis and an eye discharge, and I think it was a cruel stroke of fate that he died of the broncho-pneumonia of distemper during his fifth week in hospital, when the limb function had become far better than I ever hoped to see it.

Case No. 4. A half-bred terrier, aged about 18 months, came in with an oblique fracture of the femur in the distal third. Oblique fracture does not lend itself so readily to complete approximation as does transverse fracture. Note the gap shown in the radiograph (Fig. 5). Here again a heavier pin should have been used. The animal did not bear weight on the limb until after 14 days, and when discharged after four weeks he was walking with a slight limp. Fig. 6 shows the large callus formation in this case.

Case No. 5. This is the case which proved a failure. A six-month-old cross terrier bitch came to us with supracondylar femoral fracture, the distal fragment being diverted posteriorly. The technique was as described, and approximation proved to be extremely difficult (Fig. 7). After 48 hours, the bitch put the foot on the floor, and success seemed to be assured. She was walking at the end of the first week. This was the last case in which I left the point of the pin protruding, because I am convinced that the puppy suffered an accident in her kennel. At any rate, it was reported to me by a nurse that the puppy had been heard to squeal, and thereafter the leg was drawn up several inches from the floor level, and was never put down again. At the end of the second week I withdrew the

pin and applied a modified Thomas extension splint. She left the hospital at the end of the fourth week, and owing to an error I did not get a radiograph. At any rate, when she left, she still would not take weight on the limb.

Two other cases of transverse fracture healed uneventfully, and one was discharged after four weeks. In the second case, that of a puppy about four months, the animal contracted encephalitis and was destroyed during the fifth week, a melancholy enough end in the circumstances.

. . . . .

To sum up, it may be said that intramedullary pin fixation by open reduction is not the answer to all difficult femoral fractures. The dangers of its use are to be borne in mind: destruction of the bone marrow, fat embolism, and infection have been mentioned as disadvantages. Westerborn[4] has said that the first two objections amount to nothing at all; and Magee[5] has never seen a case of osteomyelitis following intramedullary nailing. Primary infection and post-operative sepsis remain as disadvantages with which we have to reckon. Penicillin and sulphonamides are in our hands to help to defeat these enemies.

On the credit side, intramedullary nailing maintains a full function as Brinker has said ; there is early and large callus formation with a strong union of bone. There is very little discomfort for the animal after a couple of days, and there is very little interference with the pin such as is experienced with external splinting. In transverse fracture of the shaft of the femur, I know it has brought me results which I could never have obtained from the older methods.

References

1 Knight, G. C. (1949) *Brit. Vet. J.* **105.** 294-304.
2 Brinker, W. O. (1948.) *N. Amer. vet.* **29.** 292-297.
3 Jonas, Salo. (1949.) *J. Amer. vet. med. Ass.* **115.** 9-12.
4 Westerborn, A. (1944.) *Acta chir. scand.* **90.** 89-104.
5 Magee, R. K. (1947.) *J. Canad. med. Ass.* **56.** 65-70.

ABSTRACTS

[Infertility in Cattle Associated with Death of Ova at Early Stages after Fertilisation. Laing, J. A. (1949.) *J. comp. Path.* **59.** 97–108.]

Forty-eight heifers, aged 20 months to two years, in two groups of 24, were mated under controlled conditions to determine whether infertility resulted from death of fertilised ova. To ensure as far as possible that fertilisation occurred, mating and insemination were timed carefully. Of the 24 heifers in the first group, ten had previously been served or inseminated on several occasions without becoming pregnant. All the heifers in the group were examined clinically and the genitalia appeared normal. Throughout the experiment the heifers were tested for oestrus three times a day at eight-hourly intervals by placing a fertile bull among them. Any heifer in oestrus was mated and also inseminated 15¾ hours before to one and a half hours after the end of oestrus with 1 ml. of fertile semen, which was deposited in the uterus. Rectal examination was carried out within 25¼ hours of the end of oestrus to determine whether ovulation had occurred. Six of the heifers, selected at random, were killed 40 to 66¾ hours after the end of oestrus. Fertilised ova were recovered from the oviducts of all six animals. Six heifers came into oestrus three weeks after mating. These were again mated and inseminated and killed 44 to 71 hours after oestrus. Fertilised ova were recovered in each case. The remaining heifers in this group were killed 25 to 27 days after oestrus. Normal embryos were present in nine. In three no embryos were found, but foetal membranes were present in two. Histological examination of one of these cases confirmed the absence of embryonic tissue proper. The cells of the trophoblast were enlarged and showed extensive areas of cytolysis. Signs of commencing regression were noted in the corpus luteum of one of these heifers.

The second group of heifers were studied one year later. These were selected from 100 maiden heifers and were clinically normal. The mating and insemination were carried out as in the previous year but examination to determine if ovulation had occurred was made at the 20th hour after oestrus. One heifer failed to show regular cycles and had to be discarded. The remaining 23 were mated and inseminated at times between ten hours before and seven and a half hours after the end of oestrus. Seventeen became pregnant to the first service, but six came into oestrus again 9, 19, 20, 29, 39 and 39 days after mating. Four of these six became pregnant at the second mating. The pregnant heifers were allowed to complete their pregnancies.

The recovery of fertilised ova from all the heifers in the first group slaughtered within a few days of service confirmed that the conditions were such that fertilisation was practically certain to occur. The observations on the first group suggest that ova died after fertilisation and that the mortality was of two forms. In the first the ovum developed for some days after fertilisation but died before mid-cycle so that the corpus luteum regressed as in a normal cycle, and the subsequent oestrus occurred just as if fertilisation had not occurred. In the second type, the ovum developed beyond mid-cycle so that the corpus luteum persisted, the embryo then commenced to degenerate and the corpus luteum regressed, but after a length of time greater than one oestrous cycle. The observations made in the second group were of a confirmatory nature. While it is thus clear that early death of the embryo may occur in apparently normal cattle, no definite clue as to the cause of the condition was obtained, but it is believed to be associated with anomalies of the later stages of maturation of the follicle.

A. T. C.

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[Canicola Fever in Bristol. Campbell, A. M. G., Macrae, J., Manderson, W. G., Sumner, K. C., & Broom, J. C. (1950.) *Brit. Med. J.* No. 4649. 336–340.]

The authors record six cases of canicola fever in man to add to the six previously reported in Britain by other workers. The first two cases, in a man and wife, were influenzal in type and were not diagnosed until the later stages when iridocyclitis developed. Infection appeared to be through the abraded skin of the hands, following mopping up of urine from a litter of pups. Two further patients were probably directly infected from their own dogs and one patient may have been infected while bathing in a stagnant stream fouled by dog urine. The source of infection in the sixth case was not traced.

From a restricted study of the epidemiology it seemed that infectivity of *L. canicola* is low for man and that the route of entry is most likely through skin abrasions, or transmucosal.

In general, the features of the cases recorded here were sudden fever lasting for a week or more, and accompanied by conjunctival injection, very severe headache, neck rigidity, muscular pains and signs of alimentary disorder. There is a tendency to spontaneous recovery in canicola fever, but penicillin therapy may be useful if given early enough.

The editorial comment on this article includes a summary of the signs and symptoms of the disease and lists, as important

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QUESTIONS AND ANSWERS

The submission of questions for inclusion in this column will be welcomed; they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Hormonal Treatment for Milk Retention

Q. 345.—*Is there a hormone which can be used to make an in-calf cow let down her milk when she starts holding it, and what is the method of its administration?*

A.—In cases where the "holding up" of milk is due to failure of the so-called "let-down" reflex—a neuro-hormonal reflex mechanism which comes into play in response to stimuli associated with milking or suckling (for general account see Folley, *Brit. med. Bull.* (1947.) **5.** 142)—it is possible to make the cow "let down" her milk by giving an intravenous injection of posterior-pituitary extract containing oxytocin. Dodd, Foot and Henriques (*J. Dairy Res.* (1950.) **16.** 31) find 10 units a suitable dose for a cow and there seems to be no danger of abortion provided the subject is not too far advanced in pregnancy. "Let-down" usually occurs within a minute or so of the injection.

Recent research indicates that the posterior pituitary reflexly releases oxytocin into the blood stream in response to the milking stimulus and the hormone causes contraction of certain contactile tissues (probably myoepithelial cells) closely associated with the alveolar tissue of the udder. This tends to expel milk from the alveoli down into the large ducts and cisterns from which the calf or the milker can readily extract it.

If the cow persistently holds up her milk, this treatment would have to be administered before every milking, and therefore it would hardly seem to be a practical proposition for a long-term use. It seems possible, however, that oxytocin injections might prove useful as a diagnostic in cases where persistent partial failure of "let-down" is suspected, for such cows would yield an abnormal amount of residual milk in response to an injection of oxytocin given immediately after milking out in the ordinary way.

* * * * *

Administration of Narcotic to First-farrowing Gilts

Q. 346.—*I understand that it is the practice of some pig breeders to administer some narcotic to first-farrowing gilts. This apparently results in overcoming the tendency that many have, to savage their young or to knock themselves about during farrowing. Can anyone tell me a suitable narcotic to be given per os or subcutaneously for this purpose?*

A.—In the opinion of the respondent, the administration of a narcotic to first-farrowing gilts is an undesirable practice. Viciousness at farrowing is sometimes an hereditable factor and for economic reasons such animals should be culled from the herd. More often than not, however, this vice is an indication of bad husbandry on the part of the attendants and useful advice can often be given the owner in this direction. Whether an attendant should be present at the time of farrowing is debatable but there are many excellent pig keepers who prefer to attend their breeding animals and especially their gilts when they farrow. It is very important that the person who is present should have gained the gilt's confidence during the later stages of gestation and if necessary the gilt herself should be accustomed to having a light brought into her pen at night. A good man who constantly handles a gilt during this period can save the lives of a large proportion of piglets which would otherwise die. A man who does not understand his job or who has not control over a gilt is worse than useless and can so unsettle an animal that she will deliberately savage her pigs. Warmth in the farrowing pen itself is another important precaution to prevent overcrowding or smothering of piglets. If it is certain that management is sound and the owner persists in breeding a vicious type of animal, potassium bromide given in the food before the actual start of farrowing is a suitable type of sedative.

* * * * *

Enucleation of Eyeball in Pregnant Cow

Q. 347.—*Is it safe to operate on a cow, five months pregnant, for enucleation of the eyeball? The method of anaesthesia contemplated is chloral hydrate as a narcotic and chloroform to complete the anaesthesia. Is there a danger of killing the foetus?*

A.—It would never, of course, be wise to embark on an operation on an animal, more particularly a ruminant, involving the use of a general anaesthetic, without cautioning the owner of the serious implications. There is, in the opinion of the writer, no added risk in such treatment of a cow because she is five months pregnant, nor is there any danger of killing the calf, unless the patient herself succumbs.

* * * * *

Correspondence

Diagnosis of Pregnancy in Bovines

Sir,—I write with reference to the correspondence which has appeared from time to time in *The Veterinary Record* on the diagnosis of pregnancy in bovines. It would appear from this correspondence that there is still doubt in the minds of some practitioners as to the value of palpation of the foetal membranes in this connection.

This method, which was so well described by Mr. J. L. Hancock in your issue of February 18th, 1950, was introduced to North America by Danelius, of Sweden, about 15 years ago and since that time has been used routinely by an increasing number of veterinarians engaged in sterility practice. Veterinarians who have taken the trouble to master the technique are unanimous in commending it and, for the most part, rely on it as the principal criterion of early pregnancy. In my own case, early pregnancy diagnosis has been reduced to a search for foetal membranes—when they can be palpated the cow is pregnant and no time is wasted looking for anything else. If membranes cannot be palpated, other factors may be considered before stating definitely that the cow is empty and occasionally re-examination is advised. However, membranes can be palpated in well over 90 per cent. of cows six weeks pregnant.

I agree with Mr. Hancock that palpation of the membranes is more difficult after the eighth week, but it can usually be accomplished up to about 100 days or more. When pregnancy is advanced beyond eight weeks, I find it advantageous to pick up the uterine fold immediately anterior and lateral to the cervix.

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diagnostic features, severe intractable headache, suffusion of the conjunctivae, muscular tenderness and albuminuria. Only bacteriological methods distinguish this from anicteric Weil's Disease. Reference is made to the possibility that about 40% of dogs in Great Britain are infected at some time in their lives, some contracting acute nephritis, others milder infection and others showing no signs of illness, but acting as carriers. As large numbers of leptospirae are excreted in the urine, owners of sick dogs or even of apparently healthy animals should be warned of the danger. I. W. J.

REVIEW

[Chemical Constitution and Biological Activity. By W. A. Sexton, B.Sc., PH.D., F.R.I.C. Published by E. & F. N. Spon, Ltd., 22, Henrietta Street, W.C.2. Price 55s. net.]

This is a most welcome book reviewing the mass of literature which has appeared in scientific journals on chemical composition in relation to the activity of substances upon living cells. There has been a great advance in the last 25 years in connection with the application of synthetic organic substances to the control of living processes in animals, plants, insects and microbes. The work deals, therefore, with such agents as vitamins, hormones, antibiotics and chemotherapeutic substances.

The book is divided essentially into two parts. In the first five chapters the subject is treated generally, chemical composition being considered from the aspect of biological activity. Such substances as proteins, polysaccharides, and enzymes are briefly considered. The chemical mechanisms determining drug activity are classified into those which exert their action by neutralisation of and those whose action depends upon competition for some physiologically active substance in the tissue cells. In this connection the importance of enzymic reactions is clearly brought out, considerable attention being devoted to the pioneer work which was carried out upon bacterial enzyme systems. The early work of Quastel and Wooldridge (*Biochemical Journal*, 1927, 1928) on the effects of various inhibitors upon certain oxidation mechanisms of bacteria and the importance of chemical structure in determining whether a substance was to be physiologically active or act as an inhibitor in any enzymic change does not appear to have been given its full importance in the historical development of the subject.

In the later chapters the various vitamins whose chemical structure and physiological activity are known are dealt with excellently. Special chapters are devoted to porphirins, quinones, antibiotics, hormones, and the miscellaneous bactericides, fungicides, anti-protozoal drugs, insecticides, and anthelmintics. Other chapters deal with cancer and plant growth regulators. The final chapter is concerned with antigens and antibodies. Reference might have been made in this chapter to the paper of Wooldridge and Higginbottom (*Biochemical Journal*, 1938) which showed for the first time that a bacterial product (a toxin) actually inhibited a respiratory enzyme of mammalian tissue. It was stated in this paper that: "Interference with enzymic systems necessary to the supply of energy to the tissue might readily lead to subnormality of function, which may open the way to a more active pathological condition." The dependence of health upon fully functioning enzymic mechanisms is becoming clearly recognised as the facts set out in this book are more widely appreciated.

The text is written more for the chemist than the biologist, but with careful and diligent reading it is a mine of information to members of the medical and veterinary professions. It indicates a rational approach to much of their remedial work and emphasises the importance of cellular activity in the role of health and disease.

Admittedly, palpation of the membranes is seldom necessary beyond eight weeks, but it can be done.

Not all operators will find the same method of early pregnancy diagnosis to their liking and more than one method may be satisfactory. But it is my opinion that most operators who are skilled in the more generally accepted methods will find both speed and accuracy improved by the use of the membrane technique.

Yours faithfully,

J. A. Henderson.
Department of Medicine.

Ontario Veterinary College,
Guelph, Canada.
March 11th, 1950.

VETERINARY SURGEONS ACT, 1948
Supplementary Veterinary Register

The Council of the Royal College of Veterinary Surgeons have directed the Registrar under the above Act to register in the Supplementary Veterinary Register the names of the persons set out below.

This is the fourth list of registrations and the absence of the name of any person who has made application in prescribed form before the prescribed date does not imply that such applicant has been refused registration.

The fourth list consists of further persons in whose cases the Council are satisfied that the requirements of the Act have been met.

The date of registration is Wednesday, March 15th, 1950.

Further lists of registrations in the Supplementary Veterinary Register will be published.

Fourth List of Registrations

Names and Places of Practice

Amsden, Edmond St. George, Cross Street, Stoke-on-Trent, Staffs.

Amsden, Herbert Lesley, 640, High Road, North Finchley, N.12.

Annis, Geoffrey William, 132, City Road, Cardiff, Glam.

Anthony, Hugh Robert, 23, Hall Street, Bilston, Staffs.

Anthony, Norma Josephine (Mrs.), 23, Hall Street, Bilston, Staffs.

Bain, Allan John, 59, Caterham Avenue, Barkingside, Essex.

Baker, Arthur Reginald, 15, Islington Row, Birmingham, 15.

Barnett, Aimee Lilian Jane (Miss), 33, Mayford Road, S.W.12.

Barnett, William Henry Edward, 5, Thorpe Street, Old Trafford, Manchester, 16.

Bartlett, Corbett John Manfield, Westbury, Derby Road, Wirksworth, Derbyshire.

Bates, Barbara Charlton (Miss), 85, Main Road, Burton Joyce, Notts.

Beal, Ernest John, 114, Elgin Road, Seven Kings, Essex.

Bedford, Hugh James, 46, Randolph Road, Glasgow, W.1.

Bird, William Harry Lucas, Flat 4, Denbar Parade, Eastern Avenue, Romford, Essex.

Bodger, William Ernest, 121a, St. Albans Road, Watford, Herts.

Bolton, Harold, Meeches Farm, Fritham, Lyndhurst, Hants.

Bond, Stanley, 23, Cranleigh Gardens, Luton, Bedfordshire.

Bowker, Beryl (Miss), 40, Woodland Gardens, Muswell Hill, N.10.

Buck, Alfred George John, 152, City Road, Edgbaston, Birmingham.

Bunn, Edward Alfred John, 75, Redbridge Lane, Ilford, Essex.

Burford, William Edward, The House, Ilford, Essex.

Chadwick, Peter Radcliffe Calvert, 32, Holly Park, Finchley, N.3.

Chester, Frederick Stephen James, 165, Alexandra Park Road, Wood Green, N.22.

Chilman, George Frank, 2, Abbotsford Avenue, Rutherglen, Lanarkshire.

Clark, Marjorie (Mrs.), Flat 3, 15, Marine Square, Brighton, 7.

Clark, Sidney John, 322, Creek Road, Greenwich, S.E.10.

COOK, Gordon, 7, Winscombe Avenue, Cowplain, Hants.
COOMBER, Sidney George, 36, Bath Row, Edgbaston, Birmingham, 15.
CREMINS, John, 87, Park Road, Ilford, Essex.
CRISP, George, 90, Chestnut Avenue, Romford, Essex.
CRONIN, John Thomas, 58, Herent Drive, Ilford, Essex.
DENNIS, Louie (Mrs.), 52, Cross Street, Chatham, Kent.
DOBSON, Harry Francis, 44, Baron Gardens, Barkingside, Essex.
DONALDSON, John George, 52, Putney Hill, S.W.15.
DOUTRE, Alan Edmund, 33, Beverley Road, Hull.
D'WIT, Vivian Burton, Cornerways, Melrose Road, West Mersea, Essex.
ELLIS, Michael Murray, Rolfes Hollow, Stone, Bucks.
EVANS, William Ewart Gladstone, 19, Beach Avenue, Severn Beach, Glos.
FAWSSETT, Leonard Lemale, 5, Clarendon Road, South Woodford, Essex.
FELTHAM, Leonard William, 48, Holtye Crescent, Maidstone, Kent.
FINDLAY, Florence Robina (Miss), Dudley Cottage, Twynham Road, Southbourne, Bournemouth.
FITZPATRICK, Victor Valentine, 78, Redbridge Lane, Wanstead, E.11.
FORMAN, Victor Henry, 56, Avenue Road, Southgate, N.14.
FOSSEY, Donald, 174, Bennetts Castle Lane, Dagenham, Essex.
FOULKES, Isaac Holland, Bathafarn Farm, Ruthin, N. Wales.
GAUNT, Sydney, 189, Healey Lane, Batley, Yorks.
GRAVES, James, 2, Abbotsford Avenue, Rutherglen, Lanarkshire.
HARRIS, Charles Cecil, 31, Queens Avenue, Muswell Hill, London, N.10.
HODGES, Edward, 15a, The Cliff, Roedean, Brighton.
HODGSON, David Main, 26, Hall Street, St. Helens, Lancs.
HOPE, Hubert Lawrence Wallace, The Oaklands, Five Ways, Neston, Cheshire.
HORNSEY, Henry, 26, Alexandra Road, Swansea, Glam.
HORSLEY, George Stevenson, 26, Oxford Road, Manchester, 1.
HOSE, Alfred Thomas, 41, Marlow Road, Anerley, S.E.20.
HOWARD, Michael Edward, 4, Knights Way, Barkingside, Ilford, Essex.
HURLE, Eric Francis, Claremont, The Avenue, Marton-in-Cleveland, Middlesbrough.
HURST, William Pretoria, 22, Park Road, Bromley, Kent.
JAQUES, Ronald Parker, 226, High Road, Leytonstone, E.11.
JENKINS, Arthur Walker, Hannaford, 81, Ashurst Drive, Barkingside, Ilford, Essex.
JESSOP, William John, 82, High Street, Hastings, Sussex.
JOHNSON, Hugo Harry, 32, Hudson Road, Bexleyheath, Kent.
JONES, Robert Charles James, 20, Cowley Road, Ilford, Essex.
JORDAN, Marjorie (Mrs.), 14, Kirkland Avenue, Barkingside, Ilford, Essex.
KEEN, Frederick Bertie, 2, St. Germains Road, Forest Hill, London.
KEHOE, Andrew, 33, Ripon Street, Gateshead.
KERR, Thomas Jeffrey Green, 184, High Road, London, N.W.10.
KING, Norman Topley, 4, Ford Hill, Stoke, Plymouth.
LAW, Eric Reuben, 113, Kirkdale, Sydenham, S.E.26.
LE CREN, Leonard, 4, Newark Street, Bath.
LOWRIES, Joan Edith (Mrs.), The Lodge, Woodhaw, Egham, Surrey.
LOWRIES, Robert James, The Lodge, Woodhaw, Egham, Surrey.
MARSDEN, Ruth (Mrs.), 36, Whitwell Road, Southsea, Hants.
MARSHALL, Robert, 49, York Road, Southend-on-Sea.
MORELLI, Kenneth Gordon, Heather Bank, Walderslade, Chatham, Kent.
MULVILLE, Michael, 24, Devonport Street, Stepney, E.1.
MUNRO, Walter Thomas, 247, Wellington Road South, Stockport, Cheshire.
MURES, Albert Arthur, 37, Linden Avenue, Whitstable, Kent.
NEWMAN, Jack, 7, Harts Green Road, Harborne, Birmingham, 17.
NORRIS, Donald Athelston, 78, Redbridge Lane, Wanstead, E.11.
PACKMAN, George Isaac, 60, Ednaston Road, Dunkirk, Nottingham.
PATON, Robert, 6, Clayton Road, Rush Green, Romford, Essex.
PRESTON, Ernest Cyril, Wabana, Lackford Avenue, Totton, Hants.
RHEASON, William Patrick Peter, 102, Ashbourne Road, Mitcham, Surrey.
RICHARDS, James Bernard, 21, Queens Town Road, Southampton.
ROGERS, Stanley John, 15, Douglas Road, Hounslow, Middx.
RUSSELL, Herbert, 12, Ironmill Place, Crayford, Kent.
SHEEN, Robert Bull, 250, Staines Road, Laleham, Middx.
SHIPSTONE, Charles Henry, 147, High Street, West Wickham, Kent.
SIDDERS, William Henry George, Woodview, Stubbs Cross, Ashford, Kent.
SPIERS, Arthur William, 3, Montague Place, Brighton, Sussex.
SPIERS, Eva Muriel (Mrs.), 3, Montague Place, Brighton, Sussex.
STEELE, Clifford Matthew Agers, 81, Raglan Court, Empire Way, Wembley Park, Middx.
STEVENS, Frank Gregory, 99, Cemetery Road, Leeds, 11.
STURGESS, John Marshall, 1, St. Marys Street, Northampton.
TAYLOR, Walter Michael, Fernleigh, Oaken Lanes, Codsall, Wolverhampton.
THOMPSON, Albert James, 70, Great Horton Road, Bradford, Yorks.
THOMPSON, Andrew, 60, High Street, Dover, Kent.
TUCKER, Sydney James, 56, Quentin Road, Blackheath, S.E.12.
WAINWRIGHT, Ernest Stewart, 159, Derby Street, Bolton, Lancs.
WALKER, Alfred William, Kings Brake, Long Compton, Shipston-on-Stour, Warwicks.
WALKER, Joseph John, Mavis Croft, Long Compton, Shipston-on-Stour, Warwicks.
WALKER, Percy Conrad, 32, Arundel Road, Harold Wood, Romford, Essex.
WARREN, Ralph, 77, Grove Lane, Camberwell Green, London, S.E.5.
WELLS, John, 33, Weymoor Road, Birmingham, 17.
WHITE, Leslie William, 10, Mellows Road, Woodford Avenue, Ilford, Essex.
WILLIS, Charles Thomas, 34, Seabourne Road, Boscombe, Hampshire.
YARDLEY, Samuel William, 156, Chase Side, Southgate, N.14.

QUESTIONS IN PARLIAMENT

Food and Agriculture (Ministries)

Mr. De la Bere (March 14) asked the Prime Minister whether the Government will now consider merging the Ministry of Food with the Ministry of Agriculture, with a view to ensuring better co-ordination, and securing the home market for the home producer and encouraging and developing output.

The Prime Minister (Mr. Attlee): Nothing has occurred to change the views I have expressed on this matter on several previous occasions.

Mr. De la Bere: Is the Prime Minister aware that for four and a half years the home producers in this country have been handicapped by the action of the Ministry of Food, and is it not very desirable that home production should be allowed to expand properly, which it cannot do while the Minister of Agriculture is dominated by the Minister of Food?

The Prime Minister: I thoroughly disagree with the hon. Gentleman. During the last four and a half years the home producers in this country have had a better deal than they have ever had before.

Mr. De la Bere: It is a disgraceful state of affairs.

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Bulls

Colonel Gomme-Duncan (March 14) asked the Secretary of State for Scotland how many Highland bulls are now held by the Department of Agriculture for Scotland; and how many of any other breed.

Mr. McNeil: At present the Department of Agriculture for Scotland have 82 Highland bulls, 107 Aberdeen Angus bulls, 98 Shorthorn bulls and 17 bulls of other breeds, making a total of 304.

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Bacillus Calmette Guerin (Scotland)

Mr. Rankin (March 14) asked the Secretary of State for Scotland what supplies of Bacillus Calmette Guèrin are now reaching Scotland from Denmark.

The Secretary of State for Scotland (Mr. McNeil): I am glad to say that the technical difficulties of production which led to the suspension of supplies in January have now been overcome and imports will therefore be renewed at once.

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Tuberculosis (Scotland)

Mr. Rankin (March 14) asked the Secretary of State for Scotland if he is aware that the mortality rate due to tuberculosis among young women is now 142 per 100,000; that in women from 25 to 35 years the death rate has increased from 74 per 100,000 in 1939 to 174 per 100,000 in 1947; and what steps he proposes to take in the matter.

Mr. McNeil: While I have not been able to verify the precise figures mentioned, I am aware that the increased tuberculosis mortality in the years before 1949 was particularly marked for women in the younger age groups. Although it is certain that the gross figure for 1949 shows some improvement, an analysis is not yet available. The steps we are taking to deal with tuberculosis in Scotland were outlined by my hon. Friend in the Debate on the Adjournment last Thursday.

Mr. Rankin: May I press my right hon. Friend with regard to one proposition which I made in that Debate? It was that he should consider the question of extra or special nutrition in the case of these young women.

Mr. McNeil: In the case of most of the staple rationed foods, additional rations are already available for people suffering from active tuberculosis.

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Livestock (Damage by Dogs) (Scotland)

Captain Duncan (March 14) asked the Secretary of State for Scotland how many sheep, lambs and poultry in Scotland have been reported to him as having been killed or damaged by dogs in the years 1947, 1948 and 1949; and if he will give an approximate estimate of their value.

Mr. McNeil: According to information obtained from the police the numbers of sheep (including lambs) and poultry killed or injured in Scotland by dogs in 1947 were approximately 2,600 and 1,800 respectively. The estimated value of these animals was £15,000. This information was the result of special enquiry, and is not available for 1948 and 1949.

Animal Feedingstuffs (Ration Increases)

Mr. Hare (March 16) asked the Minister of Agriculture whether the Rationing Advisory Committee has yet completed its special review of the rationing system for pigs and poultry.

Mr. T. Williams: Yes, Sir, and after careful consideration the Government have decided that the scheme for rationing animal feedingstuffs must be continued for the time being. Even if it were a workable proposal to release cereal feedingstuffs from the ration while continuing to control protein, the supply prospects for cereal feedingstuffs are not sufficiently clear to allow such a step without risk of scarcity of certain types of cereal and consequent upsetting of the balance of the agricultural production programme. Since, however, during this winter, a proportion of the coupons issued has not been used I am able to announce that from May 1st next there will be increases in the rates of rations, mainly for pigs, in order that the existing supply of feedingstuffs can be fully used.

I will circulate details in the Official Report, and I will arrange for a letter to be sent to the hon Member on the special cases of disabled persons, about which he has written to my Department.

Mr. Hare: While thanking the right hon. Gentleman for his reply, which I am sure will give satisfaction in farming circles, may I ask him again whether he has been able to consider the case of smallholders with under one acre, who, at the moment, are not able to get any benefit out of the rationing scheme? Can he give me any assurance that he will assist that particular type of person?

Mr. Williams: Perhaps the hon. Gentleman will read the reply that I shall circulate.

Following is the statement:—

Regular monthly rations for pigs under the "basic" or the extended scheme will be increased by amounts up to 50 per cent., depending on individual circumstances, together with increases in the farrowing sows allowance and the bonus on pigmeat delivered. It is hoped that this will enable a large number of pig breeders to go forward with plans to increase their stock numbers. The bonus issue on deliveries of eggs to packing stations will also be doubled.

There will also be an adjustment of dairy cow rations this summer, following discussions with the organisations concerned. Increases are being made in the monthly rations for dairy cows in August and September designed to lessen the fall in the output of milk in September, and a new allowance for September calving cows will be included.

The above changes will apply to Great Britain. Full details will be shown in the usual Press notice being released by the Agricultural Departments this week on the summer rates of rations.

AGENISED FLOUR

In an editorial note in its issue of March 18th, *The British Medical Journal* recalls that in 1946 Sir Edward Mellanby[1] demonstrated that dogs fed on a diet rich in agenised flour—wheat flour treated with nitrogen trichloride to improve it—became subject to epileptiform fits; dogs fed on flour which had not been so treated were unaffected. "Drs. P. N. Campbell and T. S. Work and Sir Edward Mellanby[2] have now isolated a crystalline toxic factor from agenised flour. Their work was guided by the use of ferrets, in which the typical epileptiform fits are produced also.

"The observation of these workers that the toxicity was confined to the gluten fraction of the flour suggested that the factor might be a modified amino-acid or peptide. A specimen of the crystalline toxic factor was hydrolysed with hydrochloric acid and yielded degradation products, identified by paper chromatography as (1) homocysteic acid, (2) α-aminobutyric acid, (3) methionine sulphoxide, (4) methionine sulphone, and (5) homoserine. Since all these compounds are possible degradation products of a molecule containing the methionine skeleton, they concluded that the toxic factor was probably derived from methionine.

"The crystalline toxic factor, which has also been obtained by Dr. Reiner by treating zein with nitrogen trichloride, produced severe epileptiform fits in a ferret that was given for five days an amount corresponding to 0·1 mg. nitrogen per day. This is a total dose of 3 mg. of the crystalline material: the pure toxic factor is thus 33,000 times as toxic as the flour itself. The authors lay emphasis on the cumulative effect of the toxic factor. In the ferret death can be produced by giving small doses over a period of five to ten days, the daily intake being a fraction of that required to produce an immediate effect."

[1] *British Medical Journal* (1946.) **2.** 885.
[2] *Nature, Lond.* (1950.) **165.** 345.

NOTES AND NEWS

Diary of Events

Mar. 29th.—Meeting of the Association of Veterinary Teachers and Research Workers (Northern Region), at Messrs. Boots Veterinary Science Division, The Priory, Thurgarton, Notts, 12.30 p.m.

Mar. 31st.—Meeting of the Society of Veterinary Practitioners, at the Holborn Restaurant, London, W.C.2, 2.30 p.m.

Apr. 6th.—Meeting of the Central Veterinary Society, at the Royal Veterinary College, N.W.1, 2 p.m.

Apr. 14th.—Dinner Dance to be held by the Yorkshire Division, N.V.M.A., at Leeds (Guildford Hotel), 7.15 for 7.30 p.m.

Apr. 14th.—Meeting of the Biochemical Society, in the Department of Biochemistry and Pharmacology, University College. Dublin, 3.15 p.m.

April 18th.—Annual Meeting of the Southern Counties Division, N.V.M.A., at Bournemouth, 6 p.m.

Apr. 19th, 20th and 21st.—**Quarterly Meetings of Council and Committees, R.C.V.S.**

Apr. 26th.—Meeting of the South-Eastern Division, N.V.M.A., at Ashford (County Hotel), 2 30 p.m.

N.V.M.A. Council and Committees

The next Council and Committee Meetings of the Association will be held at the Royal (Dick) Veterinary College, Edinburgh, on April 26th, 27th and 28th.

The time-table is as follows:—

WEDNESDAY, APRIL 26TH.
11 *a.m.* Veterinary State Medicine Committee.
2.30 *p.m.* Organising Committee.

THURSDAY, APRIL 27TH.
10 *a.m.* Home Appointments Committee.
11.30 *a.m.* Parliamentary and Public Relations Committee.
2 *p.m.* General Purposes and Finance Committee.

FRIDAY, APRIL 28TH
11 *a.m.* Council Meeting.

R.C.V.S. Examinations

May 4th.—R C.V.S. Animal Management Examinations commence at Dublin.

May 9th.—R.C.V.S. Entries for D.V.S.M. Examinations due.

May 15th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Written Examination.

May 17th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Orals and Practicals (London and Dublin).

June 8th.—R.C.V.S. D.V.S M. Written Examination commences, at Edinburgh.

June 22nd.—R.C.V.S. Membership Written Examination.

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Collection of Accurate Data on the Incidence of Disease

This project has been received with some enthusiasm by those who have volunteered to help and it appears that many farmers have shown great interest and are very willing to co-operate, but only about one-quarter of the requisite number of veterinary surgeons are participating to date. Any member, therefore, who would like more particulars is asked to write to the General Secretary, N.V.M.A., 36, Gordon Square, London, W.C.1.

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ROYAL COLLEGE OF VETERINARY SURGEONS

General Office and Central Library for Animal Diseases

As already intimated in our columns, the entrance to the general offices of the R.C.V.S. and the Central Library for Animal Diseases is now on the ground floor of *No. 9*, Red Lion Square, and not on the first floor.

ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Berks.—Church Farm, Chilton, Didcot, Berks (Mar. 20th).
Lancs.—Rochdale Collecting Centre, Rochdale, Lancs (Mar. 20th).

SHEEP SCAB:

Cumberland.—Penfold Farm and Millses Farm, Docktay, Penrith, Cumbs; Douthwaite Head, Matterdale, Penrith, Cumbs (Mar. 11th).

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PERSONAL

Births.—KERSHAW.—On March 19th, 1950, at The Nursing Home, 37, Albert Road, Ashford, to Margaret (*née* Jolliffe) wife of George Frederick Kershaw—a daughter.

STARTUP.—On March 13th, 1950, to Christine M. Startup (*née* White), M.R.C.V.S., wife of F. Geoffrey Startup, M.R.C.V.S., Worthing, Sussex—a brother for Richard, Michael Jonathan.

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Marriages.—CHADWICK—HOWELL.—On March 11th, 1950, at Holy Trinity Church, Wimbledon, Ivan Michael Chadwick, M.R.C.V.S., eldest son of Dr. and Mrs. Chadwick of King's Lynn, to Geraldine, youngest daughter of Mr. and Mrs. A. H. Howell, of Wimbledon.

DARBYSHIRE—SMALL.—The marriage took place on January 28th, 1950, in Salisbury, S. Rhodesia, of James F. Darbyshire, B.SC. (LOND.), M.R.C.V.S., the elder son of Dr. F. J. Darbyshire, of Reading, Berks, to Miss M. S. Small, the younger daughter of Mr. and Mrs. A. Small, of Bishopsworth, Bristol.

WILSON — POTTER. — At St. James Church, Holt, on March 11th, 1950, John C. Wilson, M.R.C.V.S., only son of the late Mr. R. Wilson and of Mrs. M. Wilson, "Cloughfin," Wallace Street, Dumbarton, Scotland, to Clarissa, younger daughter of Mr. and Mrs. C. J. Potter, Vicarage Farm, Holt, Wimborne, Dorset.

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Chemistry, Food Supplies and the Livestock Industry.—A lecture on this subject was delivered in the Royal College of Science on March 14th, by Mr. D. D. Ogilvie, B.SC., M.R.C.V.S., of Imperial Chemical (Pharmaceuticals) Ltd., this being one of a series arranged by the Imperial College Chemical Society, dealing with various aspects of applied chemistry and the only one of veterinary interest. Previous speakers in the series have included Dr. Lester Smith, Professor Linstead, Professor M. G. Evans, Sir Roderick Hill and Sir Cyril Hinshelwood.

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Correspondence Exchange Request.—Dr. Hans Leitner, veterinarian, of Herrenhausen Str. 90, Hannover-Herrenhausen, Germany, would appreciate the opportunity of exchanging correspondence (English) with a young veterinary surgeon in Great Britain. Dr. Leitner, who is 29 years of age, completed his studies at Hannover in 1948.

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OBITUARY

CURLEY, William Annal, The Chantry, Ilminster, Somerset. Graduated Edinburgh, December 12th, 1939. Died March 12th, 1950; aged 35 years.

RIPLEY, John Herbert, Wistaria Cottage, Ferndown, Dorset. Graduated London, July 16th, 1903. Died March 8th, 1950; aged 69 years.

John Ripley

AN APPRECIATION

John Herbert Ripley, who died recently after a few short years of well-earned retirement, was a very fine example of the older school of practitioner. He was of those many men whose names are not prominent in the politics of the profession, but who yet, in their less noticeable way, do perhaps more to enhance the dignity and prestige of the profession than some who are more in the public eye. Certainly this is true of his practice area, and were all practitioners held in such high esteem and affection by their clients as was John Ripley by his, the status of the profession would be self assured.

His life in practice, spent, as it was, mainly in the days when diagnostic ability, practical pharmacy, surgical skill and ideals

veterinarian and the easy roads of chemotherapy and laboratory service had not fully opened, puts personal qualities in their proper place.

Throughout his career his ability created trust and respect, while his wholly unselfish ideals of service inspired deep affection in his clients.

No greater tribute can be paid to him as man or as veterinary surgeon than the fact that five years after his retirement from practice, his successors never left a client without an affectionate enquiry after John Ripley.

P. H-P.

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THE CENTRAL VETERINARY SOCIETY

The subject for discussion at the meeting of the above Society to be held on Thursday, May 4th, at 2 p.m., will be "Hepatitis contagiosa canis (Rubarth)." [Fox encephalitis (Green).]

This should be a very interesting discussion as this is a new angle on a condition which is of great importance to all interested in dog diseases. Mr. T. W. F. Pay, of the Royal Veterinary College, will give the paper.

A team at the Wellcome Physiological Research Laboratories, Beckenham, under Dr. R. F. Montgomerie, has done a good deal of work on this disease and will attend the meeting to give an account of results obtained.

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FURTHER PURCHASE TAX EXEMPTIONS

A new order (S.I. 1950, No. 290), which came into operation on March 13th, exempts from Purchase Tax some additional drugs and medicines of an "essential or costly character." The Order is entitled "The Purchase Tax (No. 6) Order, 1950." All drugs previously exempt under the No. 3 Order, now revoked, remain exempt and any entries in the old list of exempt drugs and medicines which no longer appear in the Schedule to the new Order have been assimilated into more comprehensive entries therein or reclassified using the shortened name approved by the British Pharmacopoeia Nomenclature Committee.

Included under Head I (when prepared for use by injection) are organic compounds of copper (*e.g.*, certain preparations used in the treatment of rheumatoid arthritis) and plasma substitutes (*e.g.*, dextran, a polysaccharide produced from sucrose by a fermentation process). There are six additions under Head II: 1-Benzyl-3-(dimethylcarbamyloxy)-pyridinium bromide (Stigminene), an antispasmodic for post-operative use; bis-3:3'-(4-hydroxy-coumarinyl)-ethyl acetate, (B.O.E.A.), indicated for the prophylaxis and treatment of vascular thrombosis; 2:5-dihydroxybenzoic acid and its salts (*e.g.*, sodium gentisate, used in the treatment of rheumatism); 2:2'dihydroxy-5:5'-dichlorodiphenylmethane, for tape worm infestation in domestic animals; hexachlorethane, another veterinary product used for liver fluke; and 3-(1-piperidyl)-1-phenyl-1-cyclohexyl-1-propanol, and its salts, which brings in a new antispasmodic (Ortane) used in the treatment of Parkinson's disease. The new entries under Head III are 2-aminoheptane and its salts (*e.g.*, Tuamine, a vasoconstrictor); chlorocyclizine hydrochloride, a new histamine antagonist; ethers for general inhalation anaesthesia (*e.g.*, methyl n-propyl ether) and preparations of streptokinase, used intrathecally with streptomycin in the treatment of tuberculous meningitis.

Commenting on the new Order, the *Pharmaceutical Journal* observes: "It will be seen that the Order gives recognition to a number of new products of original research and somewhat belatedly to others which have been in use for a long time. It is unfortunate that new medicaments of unquestioned value cannot be introduced free of tax from the outset; it can hardly be hoped, however, that the cumbrous machinery of the Treasury Order, superimposed on the investigations of Customs and Excise and their advisers which are necessary under the present system, can be operated more frequently than twice a year. The special case of the 'essential' non-official drug lends further support, however, to the overwhelming claim for the remission of Purchase Tax from all drugs and medicines."

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PRESERVATION OF FELL PONIES

At the annual meeting of the Fell Pony Society it was stated that the National Trust had asked the Society to take over the Trust's herd of fell ponies, which was started during the war when there was a danger of the breed dying out. The Trust now stated that it felt the breed was no longer in danger, and it proposed to dispose of the herd as the Trust was not constituted to keep livestock. The Society agreed to buy the ponies at a nominal figure and resell them to its members.

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M.M.B. CATTLE BREEDING CENTRES (A.I.) MEMBERSHIP

In January, 1950, the membership of the Milk Marketing Board's cattle breeding centres (artificial insemination) passed the 50,000 mark. In December, 1949, there were 47,832 members; 2,897 new members joined during the month of January, bringing the total to 50,729.

When a farmer joins one of the Board's A.I. centres he can become either an annual member or a life member. Increasing confidence in the movement is shown by the fact that almost 40,000 milk producers are in the "life" category.

In addition, the month of January saw the Board's stud of high quality bulls reach the total of 500, which is the largest cattle breeding stud in the world. It comprises carefully selected bulls of the leading dairy breeds, together with a number of beef bulls of the Hereford, Aberdeen Angus, North Devon and Lincoln Red breeds, which are being used selectively to increase the country's meat supplies.—*The Home Farmer.*

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POULTRY IMPROVEMENT IN SCOTLAND

A Register of Accredited Poultry Breeding Stations and Accredited Hatcheries for the year 1950 has been published by the Department of Agriculture for Scotland. The Register has been compiled with the object of providing information for poultry-keepers as to sources from which hatching eggs and poultry stock of good quality may be obtained with a minimum risk as regards disease. It contains the names of breeders and hatchery owners throughout Scotland who undertake to comply with the conditions laid down in the Department's Schemes for Accredited Poultry Breeding Stations and Accredited Hatcheries respectively and whose poultry-stock, management and premises have been approved for the purposes of the Schemes. Copies of the Register may be obtained free on application to the Secretary, Department of Agriculture for Scotland, St. Andrew's House, Edinburgh, 1.

In addition to its Register of Accredited Poultry Breeding Stations and Accredited Hatcheries, the Department of Agriculture for Scotland has compiled a list of stations approved for the purpose of distributing sittings of hatching eggs and day-old chicks of pure breeds of poultry in the counties of Argyll, Caithness, Inverness, Ross and Cromarty, Sutherland and Zetland.

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DANGER FROM THE NEWER INSECTICIDES

"Powerful new insecticides are now on sale which are from three to five times as toxic as nicotine. They will shortly be in use in greenhouses, orchards and fields, and it is as well that practising doctors should be aware of the hazards they present alike to the agricultural worker and the householder," observes *The Lancet* in an annotation (March 4th) which proceeds: "They contain organic compounds of phosphorus and they are as dangerous to man and domestic animals as to the creatures they are intended to destroy. In factories protective measures can be successfully applied to prevent poisoning, but in the field the difficulties in ensuring adequate protection for individual workmen are almost insurmountable. Poisoning may be caused either by the accidental ingestion of vegetation containing systemic insecticide[1]—a risk perhaps more likely to affect animals than man—or by direct contact with the chemical during preparation or application. Some months ago Dr. James Wilson,[2] secretary of the American Medical Association's council on pharmacy, urged that the public should be protected against some of the newer insecticides; and this warning was powerfully reinforced on November 15th by Dr. Donald Hunter at the end of his Ernestine Henry lecture to the Royal College of Physicians.[3]

"Dr. Hunter was speaking particularly about the organic phosphorus compounds, of which 'Parathion' (diethyl-*para*-nitrophenyl-thiophosphate) is a good example. These compounds, discovered in Germany in 1939, were put into production in the United States and Britain soon after the end of the war and are now being widely used as sprays in agriculture. Liquid preparations, wettable powders, and dusts containing parathion are already in use; and smoke canisters containing it are being tested for the fumigation of enclosed

spaces. The organic phosphorus insecticides are alkylpolyphosphates resembling di-isopropyl fluorophosphonate (D.F.P.). They are extremely poisonous. All preparations readily penetrate the skin and exposure to no more than 0·3 g. a day may be fatal; absorption also follows inhalation and ingestion. At first the victim complains of giddiness and possibly headache, aggravated by eating or smoking; and the pupils are usually constricted to pin-point size. Then follow gastro-intestinal symptoms, muscular twitching, coma, convulsions, pulmonary oedema, and commonly incontinence of urine and faeces. In fatal cases death may occur an hour or two after the onset of symptoms. Atropine is the antidote to parathion. Large doses—up to gr. 1/30 hourly—must be given. For pulmonary oedema oxygen should be administered early and under slight pressure to overcome bronchial spasm. Where fibrillary twitching of muscles affects particularly the diaphragm, artificial respiration is necessary to save life. . . .[1]

[1] See leading article, *Lancet*, 1949, i, 658.

[2] *Ibid*, p. 717.

[3] This lecture is appearing in the *British Medical Journal*.

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EXCHANGE OF FARMING KNOWLEDGE

Modern American developments in various fields of agriculture—ranging from soil fertility to farm management—will be available to the United Kingdom through five Marshall Plan projects announced recently by the Economic Co-operation Administration Mission to the United Kingdom.

Under ECA's Technical Assistance Programme, four British specialists will make studies in the United States in their respective fields, and one American specialist will make a survey in Great Britain.

The five projects provide for:

(1) Recommendations for possible improvements in British farm management based on a two-month study in the United Kingdom by Dr. Sherman E. Johnson, Assistant Chief of the U.S. Department of Agriculture's Bureau of Agricultural Economics. Dr. Johnson arrived in London on March 4th. He will study labour efficiency on British farms, the effect of farm building layout and design on output per man, planning of the day's work, and the relation of farm-cropping programmes to labour productivity.

(2) A three-month study of U.S. planning of farm buildings by Dr. David Souter, Advisory Officer on farm buildings of the North of Scotland College of Agriculture, who arrived in Washington recently.

(3) A two-month study of U.S. grassland improvement techniques by Dr. William Davies, Director of the Grassland Research Station for Britain, who arrived in New York City on March 4th.

(4) A four-month poultry husbandry study by Miss Jean Wallace, poultry instructress at the West of Scotland Agricultural College, who is scheduled to arrive in New York City on March 27th.

(5) A two-month study of U.S. dairy farming practices by Mr. Roger Turner, agricultural economist at the West of Scotland Agricultural College, who is scheduled to arrive in New York City on the same date.

The diversified farm activities represented in the projects, the ECA said, offer a wide-scale opportunity to aid British efforts to increase efficient farm output and, at the same time, cut production costs. Dr. Johnson's farm management survey in Great Britain and Dr. Souter's farm building study in the U.S. are concerned with the need for increasing the efficiency of farm labour and introducing economies in farm operations, while Dr. Davies' grassland study will centre on methods expected to lead to better pastures and improvement of livestock output, and soil fertility of British farms. Both Miss Wallace's and Mr. Turner's studies, on poultry husbandry and dairy farming respectively, are designed to increase efficiency of output in these fields in Great Britain.

In requesting the projects, the British Government said that increased agricultural productivity requires first-hand knowledge by British experts of new techniques developed in the United States during the war and post-war years. British specialists selected for the studies were chosen on the basis of ability in their fields and the fact that, in their present positions, they will be able to disseminate widely the knowledge they gain.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

THE PATHOLOGICAL DIAGNOSIS OF SWINE FEVER

Sir,—I was interested in the instructive and practical article on "Some Aspects of Pig Production and Disease" by a former colleague, Mr. D. J. Anthony, in the *Record* of January 28th last and more particularly in his remarks on page 43 concerning the pathological diagnosis of swine fever. His views on this subject would be appreciated.

The question of the importance of the button ulcer has long been controversial. I believe it is right to say that in the United States this type of ulcer is not considered to be an essential part of the *post-mortem* picture, although, of course, it is confirmatory. Its formation is believed to be assisted by secondary invasion by *Salmonella suipestifer*.

In post-mortems in the more common acute types of outbreak the nature of the haemorrhages is, I think, a most useful factor in arriving at a diagnosis.

The most important and common sites for petechial haemorrhages to be found in these cases are the epiglottis, larynx, cortex of the kidney and the urinary bladder. The finding of petechiae in all these sites, even in different carcases, is very significant.

Congestion and a marbled appearance of the carcase lymph glands are also important.

An important microscopical pathological change is found in the central nervous system. An interesting contribution on this subject has recently been made by Hemboldt and Jungherr.[1] In 28 out of 31 uncomplicated cases of hog cholera the brain showed vascular and perivascular infiltrates, microgliosis, capillary haemorrhages and leptomeningeal infiltrations indicative of non-suppurative encephalitis. Conditions such as erysipelas, pasteurellosis, salmonellosis and haemorrhagic dysentery failed to induce the characteristic nemopathological lesions. They consider the above changes a valuable pointer in the differential diagnosis of porcine diseases.

Kernkamp's test is almost a routine procedure here, a white cell count of less than 8,000 in at least three pigs being considered further supporting evidence of a positive diagnosis.

Yours faithfully,

F. H. Manley.

Department of Bacteriology, School of Veterinary Medicine, Alabama Polytechnic Institute,
Auburn, Alabama.
February 27th, 1950.

[1] The Nemopathologic Diagnosis of Hog Cholera. Helmboldt, C. F., & Jungherr, E. L. (1950.) *Amer. J. vet. Res.* **11**. No. 38, 41

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OEDEMA OF THE BOWEL IN PIGS

Sir,—In your issue of January 28th, 1950, Mr. P. L. Shanks, as opener of the discussion on Mr. Anthony's paper, "Some Aspects of Pig Production and Disease," is reported as saying that as far as he is aware the condition known as "oedema of the bowel" in pigs has not been reported as occurring outside Britain.

In view of this, the following outbreak which I think was oedema of the bowel and which occurred on a small holding near here may be of interest.

The owner concerned had seven weaners, of which five suddenly became ill. Three pigs died within 12-24 hours of becoming ill and I did a *post-mortem* examination on another which was slaughtered *in extremis*.

The following symptoms were seen: staggering gait, oedema of eyelids, blueish discoloration of tips of ears and belly and paralysis.

The *post-mortem* examination on the one pig showed a few petechiae on the endocardium of the left ventricle, the stomach filled with feed and the mucosa reddish, an oedema of the stomach wall and the folds of the mesentery and enlargement of the mesenteric glands.

The remaining sick pig recovered, as did another which became sick on the day following my visit. No treatment was attempted other than starvation for 24 hours and then small quantities of feed for several days. At the time of the illness the pigs were being fed milk and a proprietary grain mixture.

A peculiar feature was that the pigs most severely affected came from the same pen.

As far as I am aware, there has been no other report of this

disease in South Africa, although this is no indication that it does not occur.

Yours faithfully,
B. M. McIntosh.

P.O. Box 27,
Port Shepstone,
Natal, South Africa.

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RELIEF OF TEAT OBSTRUCTION: CONTROL OF POST-OPERATIVE HAEMORRHAGE

Sir,—Your abstract of the address to the Southern Counties Veterinary Society by Mr. T. N. Gold (*The Veterinary Record*, March 4th, 1950) discusses the Hudson operation for the relief of basal and mid-teat obstructions, "prognosis depending on the degree of haemorrhage occasioned." Like all veterinary surgeons who practise this operation I have been forced to associate myself with the above prognosis.

What is needed is a line of treatment to control the post-operative haemorrhage, however slight, which by forming granulating tissue enables an obstruction to re-form and so block the teat again. With this in mind I have tried several lines of treatment and, having found the following very successful, pass the information on.

After successfully opening the obstruction with haemorrhage of any degree, the affected quarter is gently milked of approximately three-quarters of its content. I then infuse into the teat upwards of 20 c.c. of 1:1,000 sterile solution of adrenaline hydrochloride in which is dissolved "Stypen" brand Russell Viper Venom (B. W. & Co.), the strength used being 0·1 mgm. Venom. The owner is then instructed to delay milking that teat for 24 hours, thereafter milking gently twice daily for four days.

With a small teat 10 c.c. of adrenaline can be used, but with larger teats upwards of 20 c.c. has been employed. Some success has been exhibited by the use of adrenaline alone, but since the use of adrenaline and Stypen has been adopted, results have been most gratifying. To date six such cases have been treated with the combined agents, and I have not seen any sign of untoward effect on the patient either systemically or locally. One additional case was infused twice in 48 hours, but although the haemorrhage ceased effectively after the final infusion, a large thickening had already appeared in the teat sinus, rendering the operation—not the antihaemorrhage treatment—ineffective.

In addition, I should add that I have not as yet endeavoured to add to the treatment by dissolving penicillin (say 100,000 units) in the adrenaline together with the Stypen. This occurs to me to be worthy of trial and will be attempted should occasion arise.

Yours faithfully,
Eric Jones.

Masonic Chambers,
Bangor,
North Wales.

March 11th, 1950.

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COBALT THERAPY IN PREGNANCY TOXAEMIA IN EWES

Sir,—The value of cobalt therapy in the treatment of bovine post-parturient ketosis has been recorded.[1, 2, 3] Recently some Irish practitioners—notably Mr. Hunter, of Milford, and Mr. McCarroll, of Carndonagh—have found oral dosing with cobalt and sugar to be effective in cases of pregnancy toxaemia in ewes. While the number of affected ewes which have been so treated is as yet too small to draw conclusions, it is considered that cobalt treatment in this condition merits further investigation and for this reason a brief note is submitted before the present lambing season is over.

Symptoms in the affected ewes were dejection, anorexia, staggering and often marked acetone breath. Most of the ewes were carrying twin lambs. The usual treatment was oral dosing once daily for five or six days with 1 oz. of a 1 in 160 aqueous solution of cobalt sulphate plus several ounces of glucose or other sugar. In those cases in which treatment was commenced soon after the ewe first showed symptoms, recovery followed within four days. Cobalt therapy was rarely successful in an animal which had been ill for several days before the commencement of treatment; however, some such ewes lambed and recovered spontaneously.

Yours faithfully,
L. B. O'Moore.

Veterinary Research Laboratory,
Department of Agriculture, Dublin.

References

1 Halgren, W., & Sandstedt, J. (1947.) *Svensk. VetTidskr.* **52.** 89.
2 Henderson, J. A. (1947.) *Cornell Vet.* **37.** 292.
3 Hunter, W. M. D., McCarroll, P. J., & O'Moore, L. B. (1950.) *Irish Vet. J.* in press.

ELECTROCUTION AT LOW VOLTAGE

Sir,—There are many theories to explain the varying susceptibility in humans to electric shocks. In my experience, so far as animals are concerned, the two most important factors are:—

1. Site of application of the current, and
2. Resistance to the flow of the current.

Under (1) it is possible to apply a current across the brain between two electrodes which will cause death, but if the same current is applied across the loins it will cause only muscular contractions and paralysis of the hind limbs.

Under (2) the resistance of dry skin may be so great that heat and scorching are caused on the outer surfaces, but if the surfaces are moistened with water or saline solution, it assists the passage of the current.

It must be remembered also that it is the amperage developed in a current rather than the voltage which matters. In the case quoted by Mr. J. D. Peele in *The Veterinary Record* of January 28th, 1950, the current from bell wires may register 15 volts, but if tested in circuit when applied to an animal it would have recorded a very different voltage for various reasons. The current was also applied to a wet surface, namely, the mouth, in close proximity to the brain, where one would expect good conductivity to the brain.

It would not be quite correct, therefore, to say that a current of 15 volts is always lethal.

Yours faithfully,
William Tweed.

Chester.

March 13th, 1950.

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HYPNOTIC FOR CLIPPING THE NERVOUS HORSE

Sir,—Whilst chloral hydrate is used most frequently for this purpose, I believe that, when it is obtainable, fresh and standardised, extract of cannabis indica is the best and safest hypnotic to employ. This should be given in dosage of 1 to 2 drams, mixed in a little treacle, and smeared on to the tongue, or bit, two hours beforehand. It will be found to be equally satisfactory for shoeing a fractious animal. The thick and treacle-like, semi-solid extract, is excellent. The narcosis induced will be quite sufficient for the purpose required. Under no circumstances would I attempt or advise the administration of chloral hydrate in a *nervous* horse, by the intravenous route, or by stomach tube.

Yours faithfully,
J. F. D. Tutt.

"Rothiemurchus,"
Winchester.

March 18th, 1950.

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THE BRITISH COUNCIL

Sir,—Doubtless many of us have read your review column this week with more than usual interest, and have been disturbingly surprised to learn that the profession is so poorly represented on the advisory committees of the British Council and that the degree of recognition accorded veterinary work by the award of British Council Scholarships also is most inadequate.

This would appear to be a matter of sufficient magnitude to warrant an investigation being made by Council N.V.M.A. and a report being given to members.

Has the British Council blandly chosen largely to ignore our profession? If so, why?

Or, is our prestige not so high, or our position not so prominent as was hoped and believed?

Have we made our influence as a body sufficiently felt beyond the immediate contacts of the farming and animal owning public?

Have our aims and visions possibly been too parochial?

Have those with progressive views and wide outlooks always received the backing and encouragement of the profession as a whole?

Do enough of us give careful thought to professional politics and the election of our representatives on the various councils?

As your reviewer states, it is high time to enquire why such a position as he outlines should exist. Can such an enquiry be made, and may we know the results.

Yours faithfully,
B. S. Hanson.

Ashwells Farm,
Tylers Green,
High Wycombe,
Bucks.

March 19th, 1950.